SARGENT

Small Format

Interchangeable Core

Standard & XC Feature

Keying & Assembly Manual

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The 70 Series Interchangeable Core

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The 70 Series Interchangeable Core

Overview

The Interchangeable core product is a product of convenience. This product is also referred to as the BEST Style or Small Format Interchangeable Core (**SFIC**). It is designed to allow quick change out of the keying in the door.

Its use eliminates the need to breakdown the doors locking mechanism in order to repair or replace the cylinder mechanism. It is about 20% smaller in size than conventional products. The most common cylinder plug/barrel diameter is .509. The Interchangeable core plug/barrel diameter is .437. The diameter of the pins is smaller and the spacing between the pin chambers and key cuts is less than most standard size pin tumbler style cylinders.

The interchangeable core products are available in 6 or 7 pin chambered cores that are individually capped. The cores are available in three different pin size configurations. These are identified as A2, A3, and A4 pinning systems. The different dimensions of the pins and key cuts used in the A2, A3, and A4 pinning systems have an effect on the total key combination yields in the master key systems developed for each.

The following pages define the various physical components of the system. The master keying systems for these products follow the same concepts as the other Interchangeable Core manufacturers.

New Core Design

SARGENT is introducing a new patented version of the Small Format Interchangeable Core product. The pinning systems, assembly procedures, and key dimension and cutting remain the same for this new product as are used on the original version of the Small Format Interchangeable Core product. There are exploded views at the end of the manual that show the components on the new product. The elements of the XC version are pre-assembled to the plug at the factory and require no maintenance in the field.

SARGENT furnishes the new core designs for all SFIC orders and no longer furnishes the old BEST style core.

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The Interchangeable Core's Components

The following is a list of the components that make up an Interchangeable core. The numeric values correspond to numeric values as shown in the attached exploded view of the Interchangeable core. The Best style Interchangeable core is made up of several different components. (Refer to the attached exploded view) The BEST style has four of the components that are pre-assembled at the factory. SARGENT's new patented SFIC product has no sub assembled components.

For the Best Style	New SFIC Style
Plug	Cylinder Plug
Shell	Cylinder Shell
Control Sleeve	Locking Tab
Key Stop & Plug Retainer.	Cylinder Front
	Retaining Key

The remaining components are those that are used to make the core functional.

Cap Pins… These are used to seal the individual pin chambers.
Springs… These supply the necessary tension to maintain a constant pressure within the core.
Top Pins/Drivers…Selected by sized so that they insure the proper stack configuration for each of the pinning systems.

A2 System = Total Stack Value of 23
A3 System = Total Stack Value of 16
A4 System = Total Stack Value of 14

Control Pins… These pins within the pin stack allow the Control key to operate the Control Sleeve

Master Pins… These pins allow the master level keys in the key system to properly rotate the plug when they are inserted into the core.

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The Interchangeable Core's Components

Functional Component (Cont'd).

Bottom Pins… Ball end shaped pins that are size selected based on the keys that are to operate the core. These are the first level of pins in the plug. Their bottoms are rounded so they will ride up and down the slopes of the key cuts on the keys.

Key(s)… When cut to the correct depths they allow the pins in the chambers to achieve a shear line to allow the plug to rotate when the correct keys are fully inserted into the core.

Slide Cover… Some manufacturer Interchangeable cores are sealed with a slide cover instead of the individual chamber cap.

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Defining the Interchangeable Core Pinning Systems

There are three different pinning systems that can be used in the Interchangeable core.

They are referred to as the,

A2 System

This system is based on a .0125 increment size differences between each of its pins and key cut depths.

A3 System

This system is based on a .018 increment size differences between each of its pins and key cut depths.

A4 System

This system is based on a .021 increment size differences between each of its pins and key cut depths.

See page (6) Interchangeable Core Pin Size and Dimensions for a complete list of pin types and sizes for each of the systems

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Interchangeable Core Pin Size and Dimensions

Bottom Pin Numbers			Bottom Pin Sizes			Master Pin Numbers			Master Pin Sizes		
A2	A3	A4	A2	A3	A4	A2	A3	A4	A2	A3	A4
0	0	0	.110	.110	.110	-	-	-	-	-	-
1	1	1	.122	.128	.131	-	1	1	-	.018	.021
2	2	2	.135	.146	.152	2	2	2	.025	.036	.042
3	3	3	.147	.164	.173	3	3	3	.037	.054	.073
4	4	4	.160	.182	.194	4	4	4	.050	.072	.084
5	5	5	.172	.200	.215	5	5	5	.062	.090	.105
6	6		.185	.218		6	6	6	.075	.108	.126
7			.197			7	7	7	.087	.126	.147
8			.210			8	8	8	.100	.144	.168
9			.222			9	9	9	.112	.162	.189
						10	10		.125	.180	
						11	11		.137	.198	
						12	12		.150	.216	
						13	13		.162	.234	
						14			.175		
						15			.187		
						16			.200		
						17			.212		
						18			.225		
						19			.238		

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Interchangeable Core Key Blank Depth and Spacing Dimensions

Spacing between the cuts on the Interchangeable Core key blank is .150 center to center.

The distances from the notched stop on the lower portion of the point of the key blank to the,

First Cut Depth = .080
Second Cut Depth = .230
Third Cut Depth = .380
Fourth Cut Depth = .530
Fifth Cut Depth = .680
Sixth Cut Depth = .830
Seventh Cut Depth = .980

A2 System Key Blank		A3 System Key Blank		A4 System Key Blank	
Depth of Key Cut	Numeric Value	Depth of Key Cut	Numeric Value	Depth of Key Cut	Numeric Value
.318	0	.318	0	.318	0
.305	1	.300	1	.297	1
.293	2	.282	2	.276	2
.280	3	.264	3	.255	3
.268	4	.246	4	.234	4
.255	5	.228	5	.213	5
.243	6	.210	6		
.230	7				
.218	8				
.205	9				

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Interchangeable Core Key General Assembly Instructions

General Assembly Instructions.

Upon completion of the pinning chart, select an unassembled core. Align the sleeve and plug within the shell so that all the holes in each chamber are in line.

To accomplish the loading you can either hold the core in you hand or place it in an assembly block (several types are available on the market).

Start the assembly process by loading the core from the back to the front. This is the most convenient and logical as the keys are cut tip to bow.

Using the numbers calculated in the Interchangeable Core Assembly Form load the appropriate Bottom and Master pins in their proper chambers as shown in the assembly matrix.

> Seat the pins by inserting the ejector tool into the top of the chamber. Using the tool press down on the stack of pins until they are fully seated in the core.
>
> When you have completed the loading of the pins place the core in the assembly block and drop a spring into each chamber.
>
> A way to check to see if the pins are stacked correctly is to check the spring alignment the springs should be sticking above the core to uniform height.

When you have completed loading and checked the spring alignment

> Drop a cap pin into each chamber of the capping block
> Use the capping tool to seat the cap pins into the top of the core.

Remove the core from the capping block **(on the new SFIC product install the retaining clip)** inspect it to be sure the pin caps are fully seated.

> If portions of a spring have been trapped outside of the shell remove its cap and replace the spring and recap the chamber.

Interchangeable Core Key General Assembly Instructions

General Assembly Instructions (Cont'd).

Now that the core has been assembled and checked,

Try all of the keys,

Keys may not easily enter the core. Based on the method of machining the cores there may be some small burrs in side the core. Tap lightly on the key to get it to fully insert into the core. A few inserts of the key will normally eliminate the burrs.

A spray lubricant or graphite may be used to lubricate the core.

If a key will not turn or is difficult to turn

Place the core on a work surface

Gently tap on the core with a small mallet (do not us a hammer and tap gently) while holding the key fully inserted.

The objective is to move the core counter clock wise as you attempt to turn the key clock wise.

If the key will not turn at all

Recheck you're the assembly form to be sure there are no math errors.

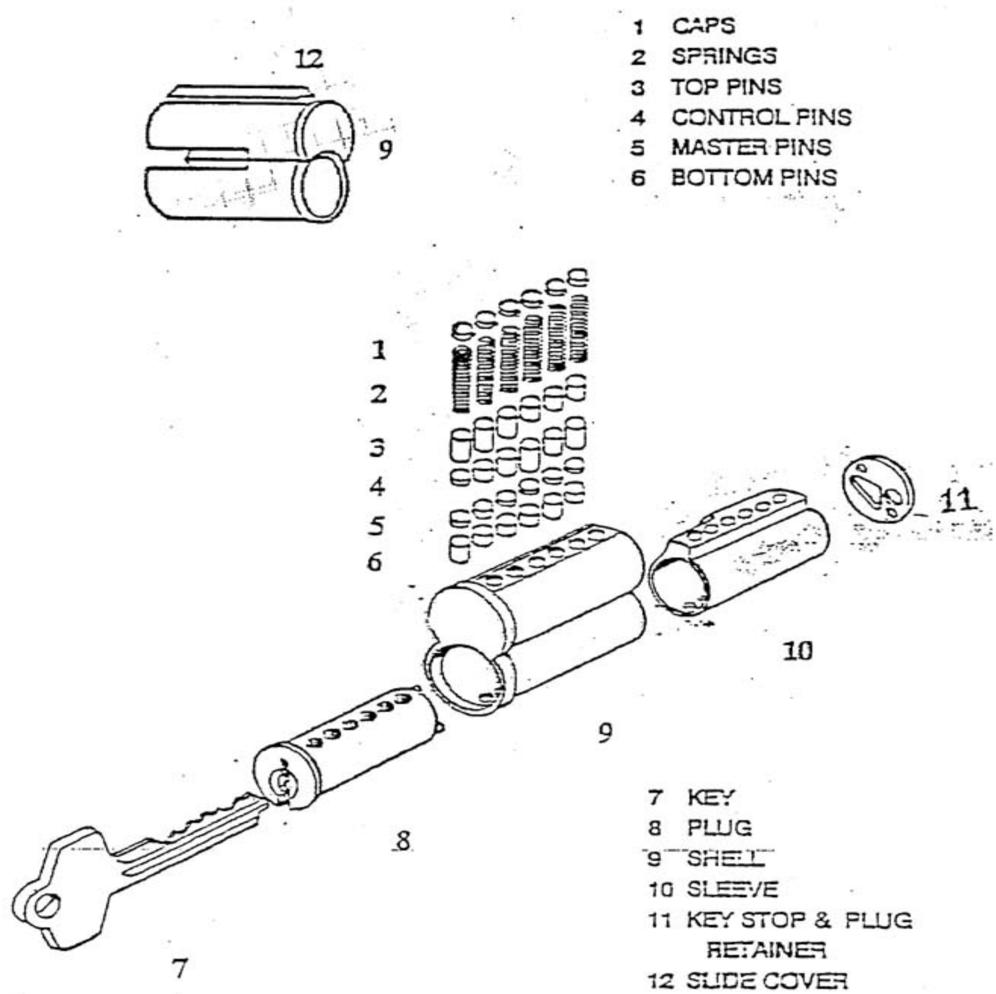
If you chart is correct then re-examine each chamber by removing them one at a time until you find the chamber that has been loaded incorrectly.

A key advantage of the Interchangeable core becomes very apparent when re-pinning a core or checking the core for proper loading. It is only necessary to re-pin the individual chambers where progression or a change to the load has taken place. It is much simpler and faster than re-pining a regular pin tumbler cylinder as you only have to expose those chambers that are affected rather than taking apart the entire cylinder.

The 70 Series Interchangeable Core Exploded View

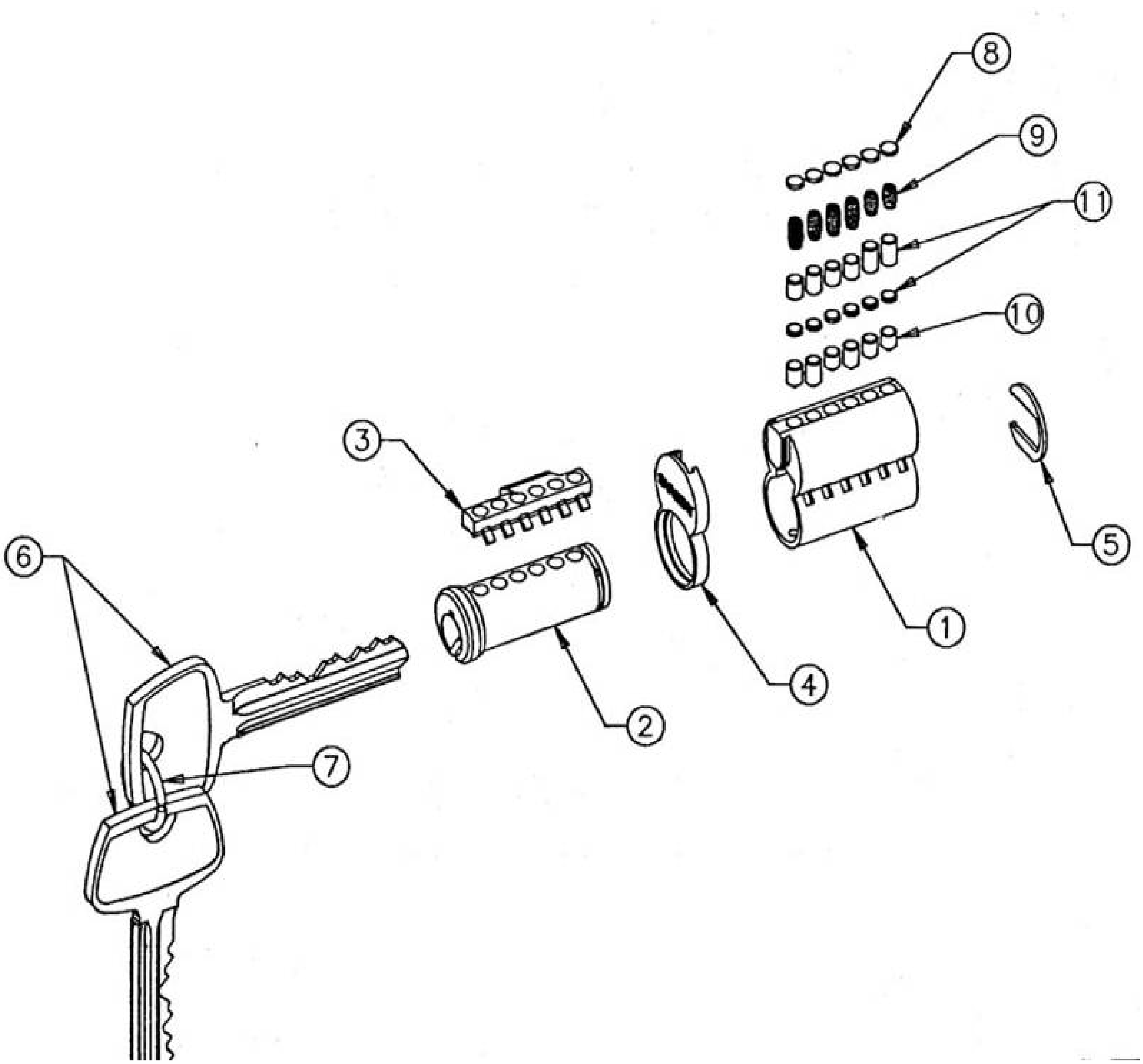
Original Arrow – BEST – Falcon Style

SARGENT no longer provides this style of core. See the next two pages for the styles now distributed from SARGENT.



The 70 Series Interchangeable Core Exploded View

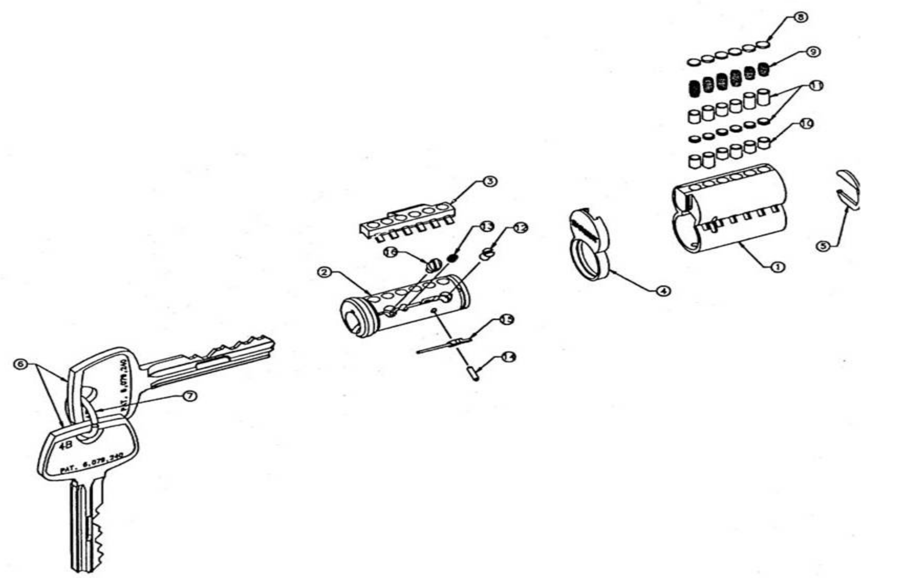
The core illustrated here is the new version of the small format interchangeable core. It is the same outside configuration as the original style core show in the previous illustration. The core can be supplied in all the same common key sections as well as SARGENT's new proprietary key sections.



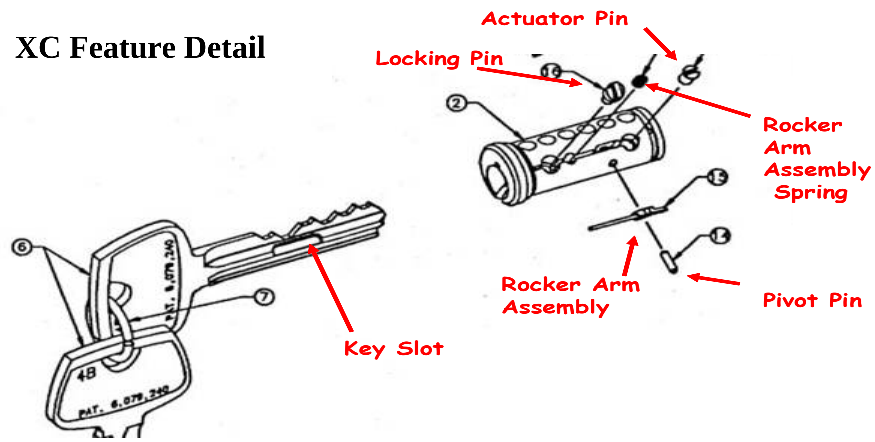
The 70 Series Interchangeable Core Exploded View

XC Patented Version

The core illustrated here is the new patented XC version of the small format interchangeable core. It is the same outside configuration as the original style core show in the previous illustration. The core can be supplied in all the same common key sections as well as SARGENT's new proprietary key sections. The core has additional components that supply the patented feature. The key has a specially milled slot in the blade that works in conjunction with the cores components that provide for the core and keys patent protection.



XC Feature Detail



The 70 Series Interchangeable Core
Example Copy of Pin Calculation Work Sheet

This work sheet is designed to show the steps necessary in calaulating the pin sizes needed to assemble the SARGENT 70 Prefix I/C core the SARGENT 70 Prefix Interchangeable Core. The method used here will also work with the ARROW BEST and FALCON I/C cores.

A) Creat List of Operating Keys (CK-MK-GMK-GGMK)			------------- CHAMBERS -------------						
on Lines 1 to 4	Line	Key	1	2	3	4	5	6	7
If additional keys are to operate use a	1	CK	5	5	2	1	2	1	2
separate sheet of paper.	2	MK	5	5	2	7	0	3	4
Note: The Control Key is not an Operating Key.	3	GM	5	1	8	7	0	3	4
Do not List the Control Key in this Area	4	GGM	3	1	8	7	0	3	4

B) Select and Enter Bottom Pin Numbers.			------------- CHAMBERS -------------						
Line 5 Enter the lowest number	Line		1	2	3	4	5	6	7
from Chambers 1 to 7 from on Lines 1 to 4	5	B/P	3	1	2	1	0	1	2

C) Select and Enter Master Split Numbers			------------- CHAMBERS -------------						
Determine the correct master pin sizes by	Line		1	2	3	4	5	6	7
subtracting the differences in the remaining	6	M/S	2	4	6	6	2	2	2
numbers in each of the Lines 1 to 4 chambers 1 to 7.	7	M/S							
Place their values on Lines 6 to 9 - Based on the	8	M/S							
level of keying all lines may not have values	9	M/S							

D) Formula for Calculating the Control Pins.			------------- CHAMBERS -------------						
Control pins only in Chambers 3 and 4.	Line		1	2	3	4	5	6	7
Line 10 Enter the bitting of the Control Key.	10	-	2	4	7	5	8	2	5
Line 11 Enter the Pin Factor: A2=10, A3=7,or A4=6	11	-	10	10	10	10	10	10	10
Line 12 Add lines 10 and 11 = Ctrl Pin Calculator No.	12	-	12	14	17	15	18	12	15
Add lines 5 to 9 and enter on Line 13	13	-	5	5	8	7	2	3	4
Line 14 Subtract Line 13 from Line 12 = Control Pin	14	-	7	9	9	8	16	9	11

E) Finally Calculate the T/P or			------------- CHAMBERS -------------						
Top/Driver Pin Number Values	Line		1	2	3	4	5	6	7

			1	2	3	4	5	6	7
Enter Stack Factor A2 = 23, A3 = 16, A4 = 14	15	-	23	23	23	23	23	23	23
Enter Ctrl Pin Calculator Number from Line 12	16	-	12	14	17	15	18	12	15
Subtract line 16 from line 15 = Top/Driver pin	17	-	11	9	6	8	5	11	8

F) Assemble Core Pinning Matrix - Enter values			------------- C H A M B E R S -------------						
from Lines 5 through Lines 9 and Lines 14 and 17	Line		1	2	3	4	5	6	7
Line 18 Enter Bottom Pin Numbers from Line 5	18	-	3	1	2	1	0	1	2
Line 19Enter Master Split M/S numbers from line 6	19	-	2	4	6	6	2	2	2
Line 20 Enter Master Split M/S numbers from line 7	20	-	-	-	-	-	-	-	-
Line 21 Enter Master Split M/S numbers from Line 8	21	-	-	-	-	-	-	-	-
Line 22 Enter Master Split M/S numbers from Line 9	22	-	-	-	-	-	-	-	-
Line 23Enter Control Pin numbers from Line 14	23		7	9	9	8	16	9	11
Line 24 Enter (T/P) Top/Driver pin from Line 17	24	-	11	9	6	8	5	11	8

The 70 Series Interchangeable Core
Template Copy of Calculation Work Sheet

G) Total Stack Value for Each Chamber			------------- C H A M B E R S -------------						
To validates Stack Height factor	Line		1	2	3	4	5	6	7
as entered on Line 16 Add Lines 18 through 23	25	-	23	23	23	23	23	23	23

This work sheet is designed to show the steps necessary in calculating the pin sizes needed to assemble the SARGENT 70 Prefix I/C core the SARGENT 70 Prefix Interchangeable Core.
The method used here will also work with the ARROW BEST and FALCON I/C cores.

A) Creat List of Operating Keys (CK-MK-GMK-GGMK)			------------- C H A M B E R S -------------						
on Lines 1 to 4	Line	Key	1	2	3	4	5	6	7
If additional keys are to operate use a	1	CK							
separate sheet of paper.	2	MK							
Note: The Control Key is not an Operating Key.	3	GM							
Do not List the Control Key in this Area	4	GGM							
						7			

B) Select and Enter Bottom Pin Numbers.			------------- C H A M B E R S -------------						
Line 5 Enter the lowest number	Line		1	2	3	4	5	6	7
from Chambers 1 to 7 from on Lines 1 to 4	5	B/P							

C) Select and Enter Master Split Numbers			------------- C H A M B E R S -------------						
Determine the correct master pin sizes by	Line		1	2	3	4	5	6	7
subtracting the differences in the remaining	6	M/S							
numbers in each of the Lines 1 to 4 chambers 1 to 7.	7	M/S							
Place their values on Lines 6 to 9 - Based on the	8	M/S							
level of keying all lines may not have values	9	M/S							

D) Formula for Calculating the Control Pins.			------------- C H A M B E R S -------------						
Control pins only in Chambers 3 and 4.	Line		1	2	3	4	5	6	7
Line 10 Enter the bitting of the Control Key.	10	-							
Line 11 Enter the Pin Factor: A2=10, A3=7,or A4=6	11	-							
Line 12 Add lines 10 and 11 = Ctrl Pin Calculator No.	12	-							
Add lines 5 to 9 and enter on Line 13	13	-							
Line 14 Subtract Line 13 from Line 12 = Control Pin	14	-							

E) Finally Calculate the T/P or			------------- C H A M B E R S -------------						
Top/Driver Pin Number Values	Line		1	2	3	4	5	6	7

Enter Stack Factor A2 = 23, A3 = 16, A4 = 14	**15**	**-**							
Enter Ctrl Pin Calculator Number from Line 12	**16**	**-**							
Subtract line 16 from line 15 = Top/Driver pin	**17**	**-**							

F) Assemble Core Pinning Matrix - Enter values			**------------- C H A M B E R S -------------**						
from Lines 5 through Lines 9 and Lines 14 and 17	**Line**		**1**	**2**	**3**	**4**	**5**	**6**	**7**
Line 18 Enter Bottom Pin Numbers from Line 5	**18**	**-**							
Line 19Enter Master Split M/S numbers from line 6	**19**	**-**							
Line 20 Enter Master Split M/S numbers from line 7	**20**	**-**							
Line 21 Enter Master Split M/S numbers from Line 8	**21**	**-**							
Line 22 Enter Master Split M/S numbers from Line 9	**22**	**-**							
Line 23Enter Control Pin numbers from Line 14	**23**								
Line 24 Enter (T/P) Top/Driver pin from Line 17	**24**	**-**							

G) Total Stack Value for Each Chamber			**------------- C H A M B E R S -------------**						
To validates Stack Height factor	**Line**		**1**	**2**	**3**	**4**	**5**	**6**	**7**
as entered on Line 16 Add Lines 18 through 23	**25**	**-**							